Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of	)	
Amendment to Part 27 of the	)	
Commission's Rules To Revise Rules	)	
for Services in the 2.3 GHz Band and	)	WT Docket No. 98-136
To Include Licensing of Services	)	
In the 47 GHz Band	)	

To: The Commission

REPLY COMMENTS OF SKY STATION INTERNATIONAL, INC.

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SUMMARY

Sky Station submits these reply comments in support of the prompt adoption of 47 GHz service rules and the establishment of a 47 GHz auction date. As set forth in the initial comments in this proceeding, there is significant demand to license 47 GHz spectrum for stratospheric and other services that will promote broadband competition, universal service, U.S. technological leadership, and the public interest. Additionally, several international companies and foreign regulatory authorities have expressed strong support for stratospheric services. The Commission, therefore, should not delay the auction of 47 GHz spectrum at the request of the satellite industry, which already has claim to 80% of the millimeter wave band and simply wants to avoid competition from stratospheric and other innovative new services.

The record in this proceeding also demonstrates that the three regulatory principles identified in Sky Station's initial comments will maximize flexibility and promote a broad array of 47 GHz uses.

1. Service Areas Based on the 12 REAGs and Other Flexible Licensing Policies. Licensing the 47 GHz band based on the 12 REAGs (with spectrum disaggregation and partitioning and including the Gulf of Mexico) is compatible with stratospheric services, the likely dominant use of the 47 GHz band. It also strikes an appropriate balance between terrestrial metropolitan systems and wide area systems, such as satellite systems, without precluding potential bidders from assembling a national footprint. The Commission also should adopt spectrum caps in order to increase the public's opportunity to access a wide variety of 47 GHz services.

2. Frequency Coordination of Stations Located Within 200 km of a Service Area Boundary and Other Sensible Technical Policies. Co-channel interference in the 47 GHz

band can be minimized effectively by requiring coordination of stations located within 200 km of a service area boundary. Since each 47 GHz licensee can decide how to use its spectrum (i.e., on a shared or unshared basis) within a REAG, there is no need for the Commission to require the use of an elevation angle discriminator or any other techniques designed to minimize interference in the same band (i.e., the same paired 100 + 100 MHz bands) in the same territory. The imposition of these types of requirements could hinder the development of innovative 47 GHz services. The mitigation techniques available for stratospheric systems obviate the need for stringent regulatory requirements relating to the protection of radio astronomy users and band directionality.

3. Other Sensible Regulatory Rules. To accommodate the needs of both governmental and commercial millimeter wave services, the Commission should adopt NTIA's proposal to allocate the 47.2-48.2 GHz band for exclusive commercial use and the 42.5-43.5 GHz band for exclusive governmental use. Additionally, as set forth in several initial comments, there is no need for the Commission to depart from its policy of allowing the FAA to regulate air safety issues. Sky Station has included multiple redundant safety features in its stratospheric system design and will obtain all necessary FAA approvals before deploying its airships.

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REPLY COMMENTS OF SKY STATION INTERNATIONAL, INC.

Sky Station International, Inc. ("Sky Station") hereby submits these reply comments in the above-referenced proceeding in support of the prompt adoption of 47 GHz service rules and the establishment of a 47 GHz auction date. As set forth below, these actions will promote competition, U.S. technological leadership, and the public interest. As Sky Station set forth in its initial comments, these 47 GHz services will be implemented most effectively by adopting three important regulatory principles: (a) licensing the 47 GHz band based on Regional Economic Area Groupings ("REAGs") and other flexible licensing policies; (b) requiring interference coordination among co-channel stations located within 200 km of the service area boundaries; and (c) adopting other sensible regulatory rules.

I. THE COMMISSION SHOULD PROMPTLY MOVE FORWARD WITH ADOPTING 47 GHZ SERVICE RULES AND AUCTIONING THE 47 GHZ BAND BASED ON REAGS.

A. The Public Interest Will Benefit From The Provision Of 47 GHz Services.

The record in this proceeding confirms that the public interest would best be served by the prompt adoption of 47 GHz service rules and the establishment of a 47 GHz

auction date. As explained in Sky Station's initial comments, 47 GHz stratospheric services have the potential to provide much needed broadband competition in the telecommunications marketplace and to promote universal service and many other important public interest objectives.[1/] Other commenters agree that the use of 47 GHz spectrum to offer stratospheric services holds great promise to bring affordable broadband services to the public.[2/]

The 47 GHz band also provides the United States with an opportunity to showcase and capitalize on its technological leadership. As noted in Sky Station's initial comments, several international companies have supported stratospheric technologies, and 47 GHz spectrum was designated for High Altitude Platform Services ("HAPS") at WRC-97.[3/]

Additionally, the global telecommunications community (including, international and foreign regulatory agencies) has expressed great interest in the implementation of HAPS systems because of their potential to provide low-cost rapid telecommunications infrastructure. For example, the Draft Strategic Plan for the International Telecommunications Union (the "ITU") 1999-2003, presented at the opening of this month's Plenipotentiary Conference in Minneapolis, Minnesota, included the development and implementation of HAPS (along with GMPCS and IMT–2000) as a priority of the Radiocommunications Sector over the next four years.[4/]

[1/] See Comments of Sky Station, at pp. 2-7.

[2/] See, e.g., Comments of Angel Technologies Corporation ("Angel"), at pp. 1-4; and Comments of Wireless Power & Light Corporation ("WP&L"), at pp. 2-3.

[3/] See Comments of Sky Station, at pp. 6-7.

[4/] Plenipotentiary Conference (PP-98) Document 26-E at para. 36, pp. 18-19, July 9, 1998 (identifying as a priority of the International Telecommunications Union Radiocommunications Sector (the "ITU-R") "to accommodate the global and regional spectrum requirements of innovative services that will provide communication and information services 'any time, any place' (e.g., GMPCS, IMT-2000 and high altitude platform stations, all of which include innovative terrestrial and space applications), by the appropriate consideration of such matters at (continued...)

Also, the Japanese Ministry of Posts and Telecommunications ("MPT") and Japan's Science and Technology Agency ("STA") have commenced an industrial initiative called "Skynet" with the stated goal of deploying up to100 HAPS beginning in 2003.[5/] At both the ITU-R WP 4-9S meeting and the ITU-R WP 9B meeting (which ended work earlier this month), Japan presented a detailed study for the operation of a HAPS system in the 20/30 GHz bands.[6/]

Finally, the European Space Agency issued an "Invitation to Tender" on May 25, 1998, seeking bidders to participate in a project called "A Study of High Altitude Long Endurance (HALE) Aerostatic Platforms in the Frame of ESA Activities," with the goal of designing and developing a HAPS system.[7/] Given these international initiatives, it is critically important that the United States continue with its technological and regulatory leadership of stratospheric telecommunications and not abdicate its role in developing this industry with its vast global economic importance. Indeed, the United States did not sit on the sidelines and watch other nations pioneer satellite communications, and it should not do so with HAPS, despite the urging of satellite interests that it do just that.[8/]

WRCs and by issuing appropriate Recommendations to facilitate their development and implementation").

[5/] See "Japan Eyes Balloons as Satellite Service Alternative," Space News, vol. 9 no. 33 (August 31-Sept. 6, 1998) at p. 14.

[6/] Japan, "Preliminary Considerations on Sharing Feasibility Between Fixed Service Using High Altitude Platform Station and Fixed Satellite Service (GSO) in the Bands 20/30 GHz," ITU-R Document 4-9S/51, ITU-R Document 9B/63, September 18, 1998.

[7/] See European Space Agency, A Study of High Altitude Long Endurance (HALE) Aerostatic Platforms in the Frame of ESA Activities, May 25, 1998.

[8/] See Comments of Hughes Communications, Inc. ("Hughes"), at pp. 2-8; Comments of Lockheed Martin Corporation ("Lockheed"), at pp. 13-14; and Comments of the Satellite Industry Association ("SIA"), at p. 3.

B. There Are No Valid Reasons For The Commission To Delay Action In This Proceeding Or The Commencement Of A 47 GHz Auction.

There are no valid reasons for the Commission to delay the auction of 47 GHz spectrum. The comments filed in this proceeding alone indicate demand for 47 GHz spectrum.[9/] Also, the Japanese government and the other initiatives described above reflect growing international interest in HAPS.

Given this indication of demand, the argument of Hughes that the Commission should determine mutual exclusivity in some collateral proceeding, and thus further delay a 47 GHz auction, should be seen for what it is -- an effort to stall competition and new services.[10/] Section 309(j) of the Communications Act directs the Commission to use auctions to assign spectrum when applications are mutually exclusive. What Hughes suggests, however, would freeze all licensing in place while rounds of engineering talks ensue. Given the evident demand for spectrum in the 47 GHz band, the Commission has more than an adequate basis to proceed to a 47 GHz auction. Any other course would only invite further delay and play into the hands of those interests that seek to postpone competition from innovative new stratospheric services.

The satellite interests also argue for delay by complaining about the risk of serial auctions.[11/] However, stratospheric services are scaleable services that can be deployed in a city, region, country, or continent. Thus, the desire to create a global footprint is not a valid basis for

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[9/] See Comments of Sky Station, at pp. 2-7; Comments of Angel, at pp. 1-4; Comments of Hughes, at pp. 1-2; Comments of Lockheed, at pp. 1-2; and Comments of Winstar Communications, Inc. ("Winstar") at pp. 1-2.

[10/] See Comments of Hughes, at pp. 2-6.

[11/] See Comments of Hughes, at pp. 6-9; Comments of Lockheed, at pp.15-16; and Comments of SIA, at pp. 3-4.

postponing the auction or selecting another licensing process.[12/] But more fundamentally, the Commission should not permit the potential threat of foreign auctions to tilt its policies. It would be folly for the Commission to carve out a portion of the 47 GHz spectrum, exempt it from auction, and thereby choose winners and losers based on a speculative concern about foreign auctions.[13/] That perverse result would be bad spectrum policy and inconsistent with Section 309(j). Finally, setting aside a national block for future use (presumably by satellite services) would be contrary to the public interest and could deny the public the benefit of stratosperhic and other new innovative services.[14/] This is simply a self-serving proposal by a satellite industry, which already has claim to approximately 80% of the nation's commercially available bandwidth in the 36-51.4 GHz band.[15/]

II. THE COMMENTS SUPPORT THE ADOPTION OF SKY STATION'S THREE REGULATORY PRINCIPLES WITH CERTAIN CLARIFICATIONS.

Sky Station's comments identified three important principles for implementing a flexible 47 GHz regulatory framework and promoting the development of stratospheric services

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12/ See Comments of Hughes, at pp. 6-9; Comments of Lockheed, at pp. 15-16; and Comments of SIA, at pp. 2-4.

13/ See Comments of Lockheed, at pp. 8-9.

14/ Id. See also Comments of SIA, at pp. 3-4. Sky Station has an interest in providing service in the Gulf of Mexico, and in areas like Houston, Texas, which border the Gulf of Mexico. Additionally, other parties, including Hughes, Lockheed, and Angel Technologies, Inc., have expressed a desire to provide national, and perhaps global 47 GHz service. As a consequence, the Commission should not treat the Gulf of Mexico any differently from any other geographic area of the United States for purposes of conducting a 47 GHz auction. Compare Comments of Petroleum Communications, Inc., at pp. 4-5.

15/ See *Amendment to Parts 2, 15, and 97 of the Commission's Rules To Permit Use of Radio Frequencies Above 40 GHz For New Radio Applications*, Memorandum Opinion and Order, ET Docket No. 94-124, Adopted June 30, 1998, Released: July 29, 1998, at ¶ 20. (the "47 GHz MO&O") (internal citations omitted). If the above 40 GHz portion of the band (i.e., 40–51.4 GHz) is considered, the picture is even more dramatic: satellite services have access to approximately 96% of the commercially available bands in that portion of the spectrum.

and other permissible 47 GHz uses. *First*, the Commission should adopt service areas based on the twelve Regional Economic Area Groupings ("REAGs"), along with other flexible regulatory policies. *Second*, the Commission should require interference coordination among co-channel stations located within 200 km of a service area boundary. *Third*, the Commission should adopt other sensible technical requirements for all 47 GHz users. As explained more fully below, the record demonstrates these three principles (with the clarifications discussed herein) will effectively accommodate the many potential 47 GHz uses and promote the public interest.

A. The Commission Should Adopt REAGs And Other Flexible Regulatory Policies.

Contrary to the views of Hughes, Lockheed, and SIA, the public interest would best be served by licensing the 47 GHz band based on the twelve REAGs (with spectrum disaggregation and partitioning, and including the Gulf of Mexico) as opposed to national spectrum blocks.[16] REAGs are compatible with stratospheric services, the likely dominant use of the 47 GHz band.[17] They also strike an appropriate balance between providing sufficient coverage areas to accommodate high density stratospheric, satellite and other wide area services and enabling companies with more regional business plans to participate in the 47 GHz auction.

Moreover, REAGs do not preclude stratospheric, satellite or other potential 47 GHz service providers from creating a national footprint because any qualified applicant can bid

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[16] See Comments of Hughes, at pp. 11; Comments of Lockheed, at p. 8-9; and Comments of SIA, at p. 3. Licensing the 47 GHz band based on REAGs also avoids the copyright issues raised by Rand McNally & Company. See Comments of Rand McNally & Company, at pp. 1-4. As set forth in footnote 14, the Commission should not exclude the Gulf of Mexico from the auction.

[17] See 47 GHz MO&O, at ¶¶ 18-30.

for contiguous geographic licenses covering the entire United States.[18] A winning bidder also can disaggregate a REAG into smaller service areas if it chooses to do so.

Consistent with the idea of promoting maximum participation, the Commission should reject the notion of allowing a single entity to aggregate 1000 MHz of 47 GHz spectrum in a single geographic service area.[19] Indeed, with a spectrum aggregation limit, the public will have more opportunity to benefit from the wide array of potential 47 GHz services, including those described in the Commission's record.[20]

B. The Commission Should Require Co-Channel Interference Coordination, Let The Marketplace Determine Sharing, And Adopt Other Sensible Technical Policies.

1. Frequency Coordination Will Minimize The Potential For Co-Channel Interference In The 47 GHz Band And The Market Can Determine Sharing.

In its initial comments, Sky Station urged the Commission to require co-channel interference coordination for stations within 200 km of a service area boundary.[21] Co-channel coordination provides a workable means to use the 47 GHz spectrum in an efficient manner while preserving the robustness of the band. However a number of the satellite commenters.

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[18] Hughes suggests that the Commission provide for the possibility of a "nationwide license for the entire 1.0 GHz of the 47 GHz band." See Hughes Comments, at p. 11. This proposal not only would undermine the Commission's public interest objectives, but it is inconsistent with the Commission's decision (which has been affirmed on reconsideration) to license the 47 GHz band based on paired 100 + 100 MHz channels. See 47 GHz MO&O, at ¶¶ 37-43.

[19] Comments of Hughes, at pp. 10-12; Comments of SIA, at p. 2; and Comments of Lockheed, at pp. 6-7.

[20] Sky Station agrees that the 47 GHz band should not be subject to the CMRS spectrum cap or any other similar policies relating to the entire millimeter wave band (*i.e.*, not just the 47 GHz band, but all spectrum above 30 GHz). See Comments of Winstar, at p. 2.

[21] In its comments, Angel also agreed that frequency coordination, as opposed to power flux density limits, should be used to minimize co-channel interference in the 47 GHz band. See Comments of Angel, at p. 8.

notwithstanding the satellite industry's claim to approximately 80% of the commercially available millimeter wave spectrum,[22] seek to lay claim to the 47 GHz band by asserting that fixed satellite services ("FSS") should be able to continue to use 47 GHz spectrum with the auction winner on a shared basis. Setting aside the serious engineering obstacles to this proposal, it makes no economic or policy sense:

- The main lesson learned from auctions is the importance of having rules that give auction winners clear and unencumbered spectrum. The risk of an FSS overlay would diminish substantially the value of the spectrum.
- Open-ended or undefined sharing possibilities and restrictive band segmentation will reduce revenues to the U.S. Treasury.
- If FSS and terrestrial users can share spectrum in new and unused bands, *let the marketplace find that solution*. An auction winner has an economic interest to allow sharing if it is technically feasible and generates revenues. The auction winner will be in the best position to coordinate, organize, and implement all uses of spectrum within a REAG and will have a commercial incentive to do so. The market should be allowed to solve these problems.

In terms of the technical obstacles, the optimistic sharing scenario offered by the satellite interests has not been supported by the studies mandated by Resolution 122 (WRC-97). To the contrary, the studies underway in ITU-R WP 4-9S have identified severe sharing difficulties between HAPS and FSS systems.[23] These conclusions are consistent with Resolution 122 which, in order to protect HAPS from the deleterious impact of satellite interference scenarios in these unused bands, prohibits the Radiocommunications Bureau from

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[22] See infra note 15.

[23] See Preliminary Draft New Recommendation, "Coordination Distance for Systems Involving High Altitude Platform Stations Sharing the Same Frequency Band with the Fixed Satellite Service", ITU-R Document 4-9S/TEMP/59; Preliminary Draft New Recommendation, "Frequency Sharing Between Systems in the Fixed Service Using High Altitude Platform Stations and Satellite Systems in the Geostationary Orbit in the Fixed Satellite Service in the Bands 47.2 – 5 and 47.9 – 48.2 GHz", ITU-R Document 9B/TEMP/67.

accepting notifications for any stations, other than a BSS feederlink or a HAPS, pending the study results.

On a related point, Angel proposes certain technical requirements (*i.e.*, the use of an elevation angle discriminator) designed to enable stratospheric and other services to share spectrum in the same band (i.e., in the same paired 100 + 100 MHz channels) and in the same geographic territory.[24/] Since the auction winner will have the right to decide how its licensed 47 GHz spectrum will be used (*i.e.*, on a shared or unshared basis), there is no need for the Commission to impose the use of an elevation angle discriminator or adopt any other policies for sharing spectrum associated with a single 47 GHz license.[25/]

Moreover, the use of an elevation angle discriminator would reduce the robustness of 47 GHz services. *First*, the elevation angle discriminator as proposed by Angel does not provide adequate interference protection between HAPS and fixed service systems. Due to the curvature of the Earth's surface, fixed service antennas with elevation angles below 10-degrees still can be pointing directly at a HAPS and cause unacceptable interference through sidelobe coupling of the HAPS antennas. *Second*, the elevation angle discriminator does nothing to mitigate the interference between ground stations of the HAPS system and fixed service systems. Extensive studies carried out by ITU-R WP 9B have shown conclusively that a large

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[24/] See Comments of Angel, at pp. 8, 10. If Angel acquires a 47 GHz license and decides to share this spectrum with other users, it will be free to utilize an elevation angle discriminator. However, since the 47 GHz spectrum will be auctioned and each licensee will have the right to decide how to use its spectrum, there is no need to *impose* this requirement in the Commission's rules.

[25/] Because the ITU at WRC-97 has adopted a new definition of HAPS, Sky Station believes the Commission should use this definition unanimously adopted by 188 countries. Compare Comments of Angel, at pp. 9-10 (suggesting a definition of "high altitude platform stations" from 15-50 km). Also, to avoid potential interference, the Commission should adopt its proposed 16 dBW EIRP power limit and not increase it to 44 dBW. Compare Comments of Angel, at p. 7 (suggesting a 44 dBW limit)

exclusion area is required to avoid interference between HAPS ground stations and fixed service systems.[26] Given that HAPS ground terminals are mass-consumer devices (and expected to be ubiquitous in a metropolitan area), co-channel sharing with fixed service systems in the same area would severely restrict both applications and make them economically unfeasible.

Finally, Hughes expressed concern about several unspecified potential interference scenarios, although its comments addressed only the potential co-channel interference between terrestrial and satellite systems in adjacent REAGs.[27] As proposed in Sky Station's initial comments, this interference concern will best be resolved by requiring coordination of stations within 200 km of the service area boundary. Moreover, if Hughes or any other bidder does not want to comply with a coordination requirement, it can bid for licenses in the same paired channel block and aggregate the national footprint it seeks.

2. An Appropriate Spurious Emission Limitation And The Criteria Established By The ITU-R Will Adequately Protect Radio Astronomy Services In The 42.5-43.5 And 48.94-49.04 GHz Band.

Sky Station recognizes the importance of radio astronomy services in the 42.5-43.5 and 48.94-49.04 GHz band ("RAS") and the need to protect them from harmful out-of-band

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[26] See Preliminary Draft New Recommendation, "Frequency Sharing Between Systems in the Fixed Service Using High Altitude Platform Stations and Other Systems in the Fixed Satellite Service in the bands 47.2 – 47.5 GHz and 47.9 – 48.2 GHz," ITU-R Document 9B/TEMP/18; Preliminary Draft New Recommendation, "Coordination Distance for Systems Involving High Altitude Platform Stations Sharing the Same Frequency Band with the Fixed Service," ITU-R Document 9B/TEMP/19; Preliminary Draft New Recommendation, "Preferred Characteristics of Systems in the Fixed Service Using High Altitude Platforms Operating in the 47.2 – 48.2 GHz Band," ITU-R Document 9B/TEMP/20.

[27] See Comments of Hughes, at p. 4. Hughes used outdated and inaccurate parameters for Sky Station's HAPS system. Accurate system parameters have been available since June, 1998 at "Technical Parameters for Typical Systems Using High Altitude Platforms", ITU-R 9B Document 26; WP 4-9S Document 16.

emissions.[28] Indeed, over the past two years, Sky Station has met repeatedly with radio astronomy users and obtained technical data and information on their operations and interference protection requirements. Additionally, the ITU-R has carefully examined the needs of RAS users, including how to protect them from potential spurious 47 GHz emissions. Sky Station has used this data and research in designing its system

Based on this extensive information and consistent with the comments of NTIA, Sky Station recommends that the Commission protect RAS users by adopting:

- the Commission's proposed spurious emission standard, subject to decreasing the 80 decibel requirement as proposed by Lockheed,[29] and
- the ITU-R protection criteria for radioastronomical measurements in these bands, which is -227dB(W/(m2Hz)(Rec. ITU-R RA.769-1).[30]

These two standards, combined with the filtering, beam shaping and other interference mitigation characteristics of stratospheric services, will ensure that RAS users do not experience harmful interference from the 47 GHz band.[31] The effectiveness of this protection was recognized by the ITU-R Joint Rapporteur Group 7D-9D (the "JRG 7D-9D"), on October 9,

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[28] See Comments of the National Academy of Sciences ("NAS"), at pp. 2-5; Comments of the National Radio Astronomy Observatory ("NRAO"), at pp. 1-3; and Comments of the National Telecommunications and Information Administration ("NTIA"), at p. 3.

[29] The Commission proposed that 47 GHz licensees attenuate transmitter power ("P") by at least 43+10log10(P) or 80 decibels, whichever is less, for emissions on any frequency not included in the licensee's authorization. Notice at ¶ 131. Sky Station agrees with Lockheed that the 80 decibel requirement (which is more stringent than the ITU requirement) probably can be relaxed. See Comments of Lockheed, at pp. 12-13

[30] See Comments of NTIA, at p.3.

[31] The interference studies relied upon by NAS and NRAO are based on incorrect technical information and consequently overstate the potential interference to RAS services from 47 GHz users. See Comments of NAS, at pp. 7-9; and Comments of NRAO, at pp. 1-3. For instance, their comments assume there are no filtering or beam shaping devices, yet stratospheric stations will use those devices.

1998, when it affirmed that stratospheric systems have a wide range of techniques for preventing interference to RAS.[32/] Indeed, JRG 7D-9D concluded that, "spurious emissions by HAPS in the 43 GHz and 49 GHz radio astronomy bands at specific radio astronomy sites can be reduced to below the detrimental threshold by various methods."[33/] The Commission therefore should adopt its proposed spurious emission standard, subject to the proposal by Lockheed, and follow the sensible approach of the ITU-R.

3. The Commission Should Not Impose A Directionality Requirement For 47 GHz Services.

The flexibility of stratospheric systems also obviates the need to impose a directionality requirement for 47 GHz services. In its comments, NTIA suggests that HAPS transmit in the lower part of the band and receive in the upper part of the band to minimize second harmonic interference to "synthetic vision systems" around 94 GHz.[34/] Sky Station recognizes the importance of 94 GHz systems and will work to ensure that second harmonic interference is mitigated through the design and implementation of its system. In order to preserve operator flexibility, however, directionality rules should not be imposed at this time. Instead, 47 GHz licensees should be required to ensure that second harmonic interference is minimized by using appropriate mitigation techniques. More information will become available on the evolving requirements of both "synthetic vision systems" and HAPS systems with respect to the second harmonic. In the meantime, HAPS system operational flexibility should not be

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32/ As explained in NAS's comments, JRG 7D-9D is responsible for analyzing the potential interference to the RAS service from HAPS. Id. at 5-6.

33/ The substance of the JRG document is set forth in Attachment A. The official printed version of the text has not been released.

34/ See Comments of NTIA, at p.3.

prematurely restricted by the imposition of a directionality requirement, particularly given the many mitigation techniques that are available.

C. The Commission Should Adopt Other Sensible Rules On Government Sharing.

Sky Station and other commenters emphasized the importance of ensuring that government spectrum sharing policies do not stymie the development of new 47 GHz services.[35/] In its comments, NTIA also recognized this concern and proposed that the 47.2-48.2 GHz band be reallocated for exclusive commercial use and that the unused 42.5- 43.5 GHz band be allocated for exclusive governmental use.[36/] Sky Station urges the Commission to adopt NTIA's sensible approach and allow 47 GHz services to flourish without the risk of losing spectrum for government uses.[37/]

35/ See Comments of Sky Station, at p. 18; Comments of Angel, at pp. 5-6; and Comments of WP&L, at p. 1.

36/ See Comments of NTIA, at p. 2.

37/ As set forth in the initial comments of Sky Station, Angel, and WP&L, the FAA has jurisdiction over air safety issues relating to stratospheric services. Sky Station has included multiple redundant safety features in its system design and will obtain the necessary FAA approvals prior to deploying its platforms. See Comments of Sky Station, at pp. 17-18; Comments of Angel, at p. 11; Comments of WP&L, at p. 3. Therefore, the Commission should not (and need not) address air safety matters in this proceeding or request more technical information from stratospheric providers before commencing the 47 GHz licensing process. Compare Comments of Lockheed, at pp. 13-14.

As a related point, the Commission does not regulate safety issues relating to the installation of transmitter towers and the launch of satellite systems. There is no reason why the Commission should treat the deployment of stratospheric airships any differently than it treats the construction of towers and the launch of satellites. Therefore, to the extent the Commission believes it needs to examine safety issues relating to stratospheric services, it perhaps should include tower construction and satellite launches in its review.

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As set forth above, the record in this proceeding confirms the ever-growing consensus that the 47 GHz band can promote competition, universal service, U.S. technological leadership and many other public interest benefits. For these reasons, the Commission promptly should adopt 47 GHz service rules (as described herein) and establish a 47 GHz auction date.

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ATTACHMENT A

At its meeting ending on October 9, 1998, JRG 7D-9D agreed on the following language concerning HAPS interference mitigation techniques in developing Draft CPM Text in response to Resolution 122 (WRC-97):

Interference mitigation techniques and regulatory considerations.

A number of interference mitigation techniques may be used in the design of a HAPS system to prevent or reduce the spurious interference into radio astronomy sites to acceptable levels. These include:

- antenna design,
- signal and modulation design, and
- filtering of the radio-frequency signal before transmission.

Filtering needed in order to minimize ISI (Inter-Symbol-Interference) and to reduce out-of-band emission, can be achieved with a raised cosine filter, which can be implemented either with SAW filters alone, or with a combination of digital (baseband) filtering and analogue filtering using SAW filter(s). SAW filter techniques are extremely flexible: any linear bandpass filter may be synthesized, with arbitrary amplitude and phase, limited only by line width and crystal size. Typically single-phase unidirectional transducer (SPUDT) type SAW filters can attenuate out-of-band emission by up to 60 dB, with a passband flatness of less than 0.5 dB peak-to-peak, and a phase ripple of less than 1 degree. This, together with another 16 dB ($10\log 4\pi^2$) attenuation at the first sidelobe of the QPSK power spectral density curve, a 75 dB reduction of the out-of-band emission is readily achievable.

If additional filtering is required to meet specific spurious-interference incidents, waveguide filters can be implemented in the beams of HAPS that require such filters. As a last resort, HAPS could reduce the level of spurious emissions at RAS antennas by avoiding service cells near a RAS antenna, or reducing the gain of multiple service antennas toward a RAS antenna, if the use of other mitigation techniques requires further augmentation.

In summary, it is concluded that spurious emissions by HAPS in the 43 GHz and 49 GHz radio astronomy bands at specific radio astronomy sites can be reduced to below the detrimental threshold levels by various methods.[1/]

1/ ITU-R Document JRG 7D-9D/TEMP1/Corr.1 October 9, 1998, pp. 3-4. See Comments of NTIA, at p. 3.